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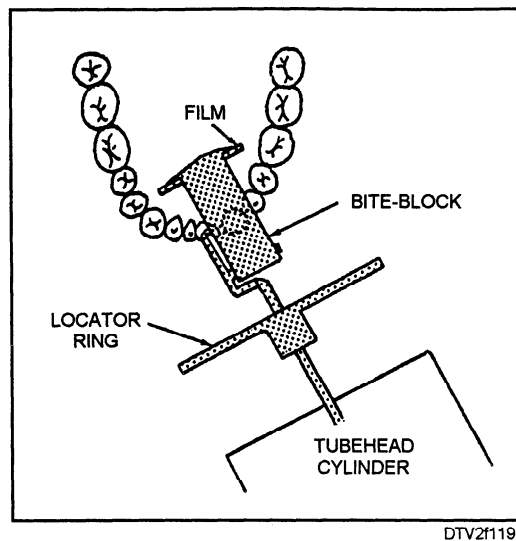


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Figure 1-18.—Film and cylinder placement: mandibular incisor area.

position. In order to adapt the packet to the area being radiographed and to relieve patient discomfort, it may be necessary to shape the packet. Do this by gently flexing the corners of the packet and holding it over the end of your thumb. Do not crease the packet.

Center the packet behind the tooth to be radiographed. The printed side of the packet should face away from the tooth, with the printed dot toward the occlusal surface. The film is held as close to the tooth as possible. At this point the long axis of the tooth



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Figure 1-19.—Film and cylinder placement: mandibular cuspid area.

and the plane of the film should be nearly parallel. In order to project the proper image of the tooth onto the film, you must visualize an imaginary line bisecting the long axis of the tooth and the plane of the dental film (fig. 1-25). The central ray is then directed perpendicular (a 90° angle) to the bisecting line. This will project the proper dimensions of the tooth onto the film without elongation or foreshortening. If the anterior curvature of the patient's arch is narrow, insert a cotton roll between the packet and the teeth. This prevents the film from bending excessively and producing a distorted image.

Once the film packet is properly positioned, guide a free hand of the patient to the holding device. The

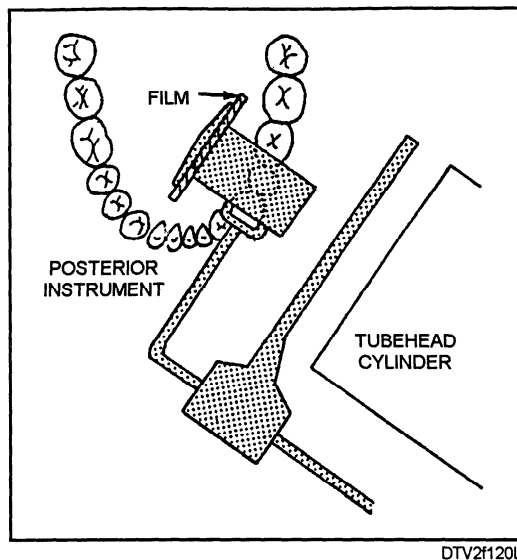
patient gently holds the device with the hand from the opposite side of the arch being radiographed.

WARNING: The assistant should never hold the film packet in position during an exposure.

Each time you take radiographs, use the standard film positions. This helps when comparing radiographs made at different times.

Positioning the Tube Head

After the film is inserted in the patient's mouth, position the tube head so the end of the cylinder is near the area to be radiographed. Then, position the tube head for correct vertical and horizontal angulation



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Figure 1-20.—Film and cylinder placement: mandibular bicuspid area.

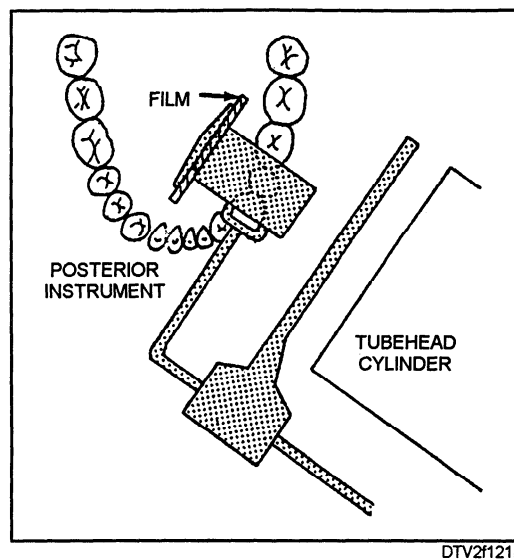
using anatomical landmarks on the patient's face. Tell your patient to maintain the position of the placement of the dental film and not to move while you expose the radiograph.

VERTICAL ANGULATION.—This is the up-and-down positioning of the tube head. A 0° vertical angulation indicates that the tube head is positioned with the cylinder parallel with the floor (fig. 1-26). Angling the tube head so the cylinder points upward from 0° will give you a minus (–) degree of vertical angulation. Angling the tube head so the cylinder points downward from 0° will give you a plus (+) degree of vertical angulation.

Different areas of the mouth require different degrees of vertical angulation. The correct vertical angulation can usually be obtained by using the angles shown on the chart in figure 1-26. Notice the tube head is angled downward for maxillary radiographs, and usually angled upward for mandibular radiographs. The tube head may be horizontal (0°) when X-raying mandibular molars.

A wrong angulation results in a distorted radiograph. Too little vertical angulation elongates the radiographic image (fig. 1-27); too much vertical angulation foreshortens the image (fig. 1-28).

A standard vertical angulation cannot be used for all patients because of differences in their oral

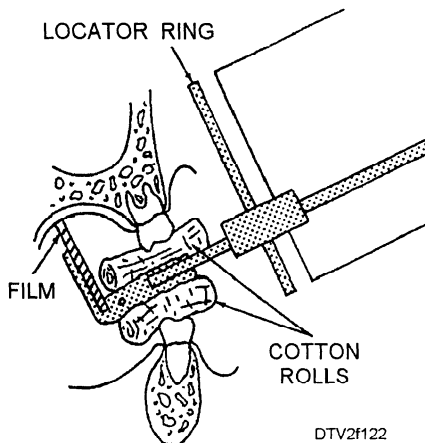


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Figure 1-21.—Film and cylinder placement: mandibular molar area.



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Figure 1-22.—Film and cylinder placement: patients with low palatal vaults or edentulous arches.

structures. A patient may have an unusually high maxillary vault or an unusually deep palatal vault. In either case, you would decrease the standard vertical angulation by about 5° . On the other hand, for a patient with an unusually shallow vault, you would increase the angulation by about 5° . The more experienced you become in X-ray techniques, the easier it will be for you to determine when to alter standard vertical angulation to suit the needs of a particular patient.

After you have determined the correct vertical angulation for the area to be radiographed, adjust the tube head using the angle dial on the tube head as a reference.



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Figure 1-23.—Ala-tragus line parallel with the floor.



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Figure 1-24.—Line from the corner of the mouth to the tragus parallel with the floor.

When the tube head has been set for the proper vertical angulation, center the tube head cylinder on the area to be radiographed. The cylinder should almost touch the surface of the patient's skin. Then, position the tube head for correct horizontal angulation.

HORIZONTAL ANGULATION.—This is the side-to-side positioning of the tube head. Position the

tube head so the central X-ray beam is directed straight through the embrasures of the teeth being radiographed. If the horizontal angulation is faulty, the central ray will be directed at an angle to the embrasures. This will produce a faulty radiograph, with the images of the teeth overlapping one another. Figure 1-29 illustrates the correct and incorrect cylinder direction.

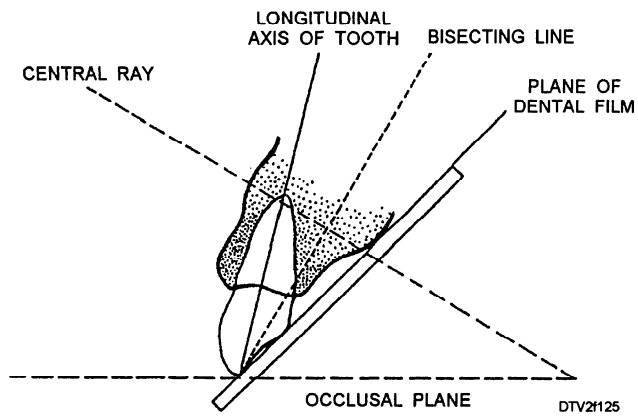
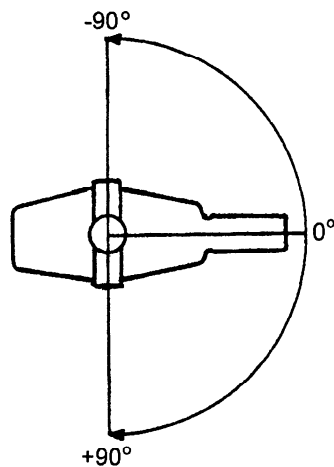


Figure 1-25.—Relationship of central ray, tooth, and film packet in bisecting-angle technique.

GUIDELINES FOR TAKING PERIAPICAL RADIOGRAPHS, BISECTING-ANGLE TECHNIQUE

Take the same 14 radiographs using the same exposure sequence as that discussed for the paralleling technique. Complete the following steps:

1. Program the X-ray machine for the discussed mA and kVp settings. The exposure time varies, just as it did with the paralleling technique. Refer to the film



Maxillary		Mandibular	
Incisor	+40 to +45	Incisor	-15 to -20
Cuspid	+45 to +50	Cuspid	-20 to -25
Bicuspid	+30 to +35	Bicuspid	-10 to -15
Molar	+20 to +25	Molar	-5 to 0

Figure 1-26.—Average vertical angulation.

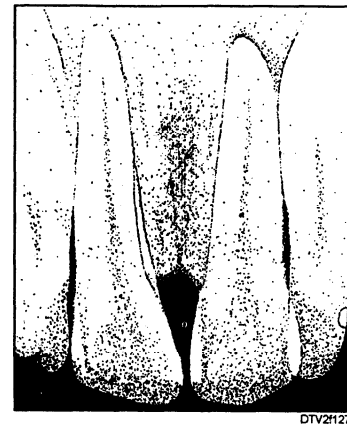


Figure 1-27.—Elongated image.

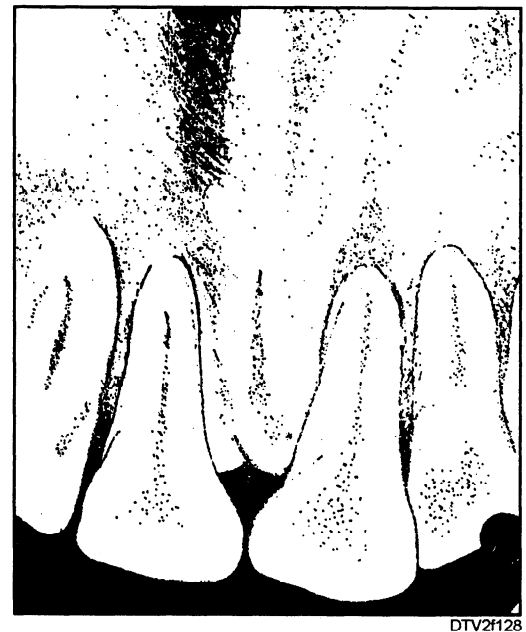


Figure 1-28.—Foreshortened image.

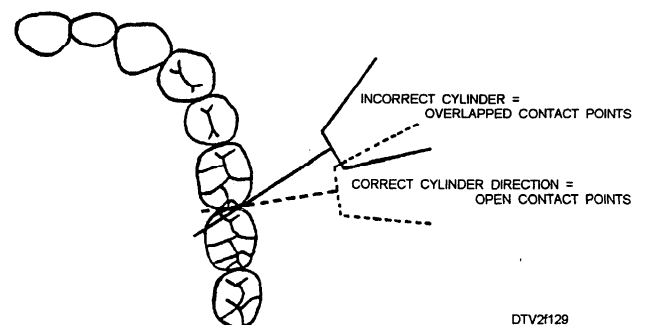


Figure 1-29.—Correct and incorrect cylinder direction.

manufacturer's instructions for correct time/impulse settings. Remember to reduce the kVp by 5 when taking radiographs in edentulous areas, and to 70 when taking radiographs on children.

2. Position the patient as shown in figure 1-23 for maxillary radiographs or figure 1-24 for mandibular radiographs. Remember that the patient's midsagittal plane must be perpendicular to the floor.

3. Position the film packet in the patient's mouth. Have the patient hold the film packet in place with a pair of hemostats or other holding device.

4. Set the vertical angulation of the tube head according to the chart in figure 1-26.

5. Center the tube head cylinder on the area to be radiographed. To simplify this process, the numbered anatomical landmarks are provided in figure 1-30. Take radiographs of the area by centering the tube head cylinder on these landmarks:

- Maxillary incisor area: Landmark 1, the tip of the nose.
- Maxillary cuspid area: Landmark 2, beside the ala of the nose.
- Maxillary bicuspid area: Landmark 3, below the pupil of the eye.
- Maxillary molar area: Landmark 4, below the outer angle of the eye and below the zygomatic bone.
- Mandibular incisor area: Landmark 5, the tip of the chin.
- Mandibular cuspid area: Landmark 6, directly below landmark 2 1/4 inches above the lower border of the mandible.

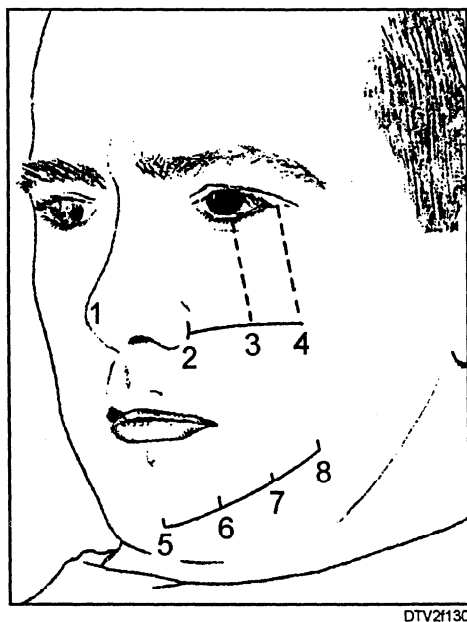


Figure 1-30.—Cylinder positioning landmarks for periapical radiographs.

- Mandibular bicuspid area: Landmark 7, directly below landmark 3 1/4 inches above the lower border of the mandible.
- Mandibular molar area: Landmark 8, directly below landmark 4 1/4 inches above the lower border of the mandible.

6. When you have the tube head cylinder centered on the horizontal landmark, double check to make sure that you have the correct horizontal angulation. The central X-ray beam should be projected straight through embrasures of the teeth to be radiographed.

7. Make the exposure.

8. Remove the film packet from the patient's mouth and place it in a clean paper cup. Place the disposable container in a lead container or behind a protective screen before making the next exposure.

INTERPROXIMAL (BITEWING) EXAMINATION

The interproximal examination reveals the presence of interproximal caries, certain pulp conditions, overhanging restorations, improperly fitting crowns, recurrent caries beneath restorations, and resorption of the alveolar bone.

A typical interproximal radiograph (fig. 1-31) records in a single exposure the coronal and cervical portions of both maxillary and mandibular teeth, along with the alveolar bone of the region.

Bitewing X-ray film packets are used for the interpromixal examination. The bitewing film packet (fig. 1-32) has a paper tab, or wing, that the patient bites on to hold the packet in place during the exposure (thus the name bitewing).

Interpromixal radiographs can be made using either the paralleling technique or the bisecting angle technique.

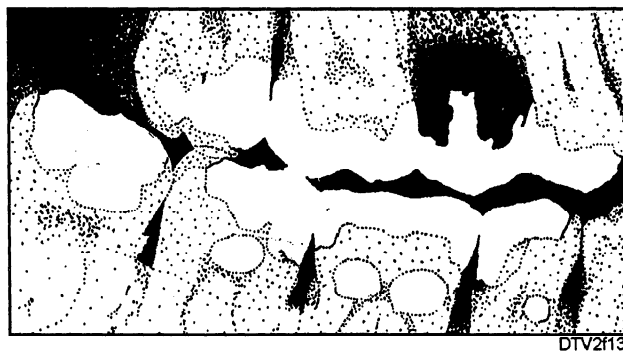


Figure 1-31.—Typical interproximal (bitewing) radiograph.

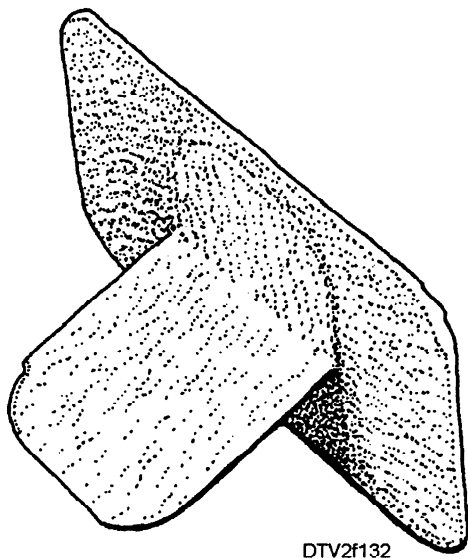


Figure 1-32.—Bitewing film packet.

PARALLEL PLACEMENT TECHNIQUE

The following procedures describe this technique:

1. Program the X-ray machine for the discussed time, mA settings, and kVp settings.
2. Prepare the inter-proximal paralleling device (fig. 1-33). Fold the bitewing tab against the film packet and insert the packet into the bite-block so that the printed side faces the backing support. Insert the end of the indicator rod into the holes in the bite-block. Slide the locator ring onto the indicator rod. Look through the locator ring to see if the bite-block is centered in the ring. If it is, the paralleling device is ready for positioning in the patient's mouth.
3. Position the paralleling device with film in the patient's mouth so that the anterior edge of the film touches the distal surface of the mandibular cuspid (fig. 1-34). Have the patient close gently but firmly on the bite-block to hold the film in position.

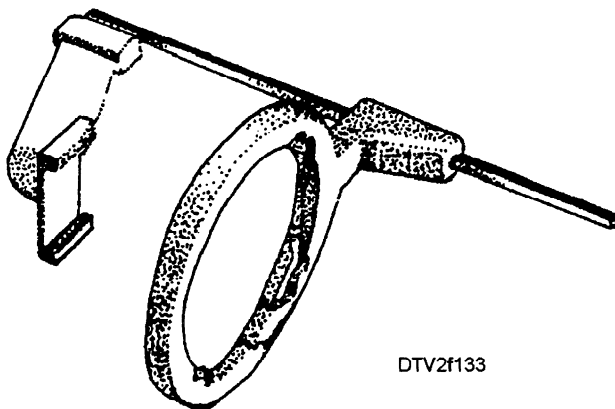


Figure 1-33.—Interproximal paralleling device.

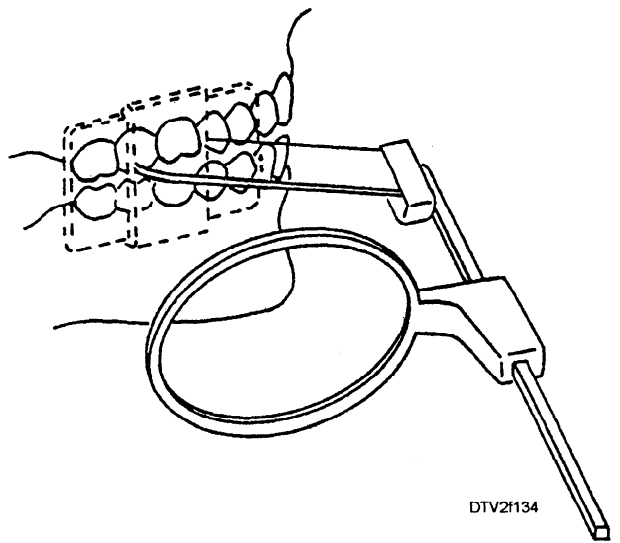


Figure 1-34.—Paralleling device positioned for interproximal radiographs.

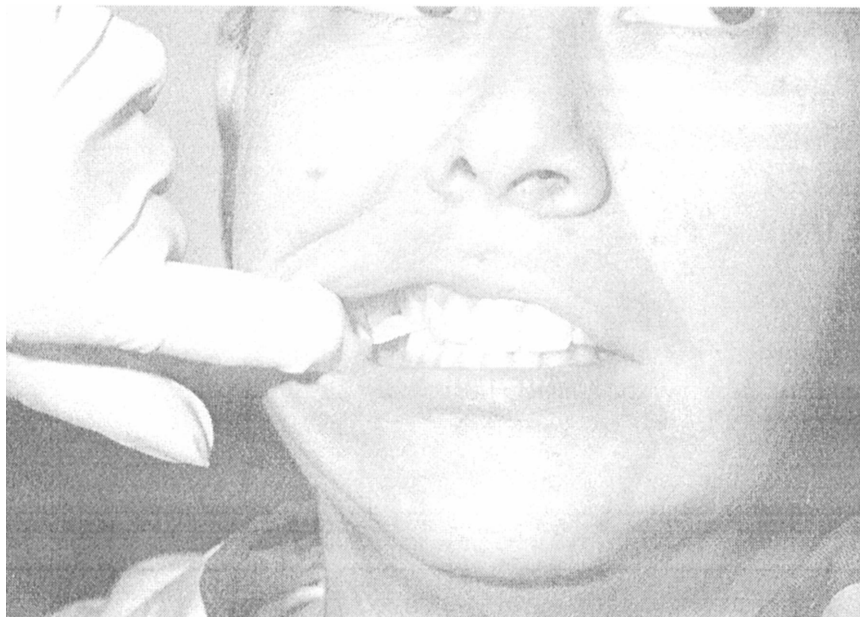
4. Slide the locator ring down the indicator rod until the ring almost touches the surface of the patient's face. Then, align the tube head using the same technique as previously described for the paralleling device.

5. Make the exposure. After making the exposure, put the exposed film in a lead lined container or behind a protective screen. You are now ready to take the radiograph on the opposite side of the patient's mouth.

BISECTING-ANGLE TECHNIQUE

The following procedures describe this technique:

1. Program the X-ray machine for the discussed time, mA settings, and kVp settings.
2. Position the patient so that the ala-tragus line is parallel with the floor, and the midsagittal plane is perpendicular to the floor.
3. Position the film packet in the patient's mouth. Hold the wing of the packet between your thumb and index finger. Place the lower edge of the packet between the tongue and the lingual surfaces of the mandibular teeth. Position the packet so that its anterior edge touches the distal surface of the mandibular cuspid. Rest the wing of the packet on the occlusal surfaces of the mandibular teeth. Instruct the patient to close slowly. As the patient's maxillary teeth contact your index finger, roll your finger out facially, permitting the patient's teeth to close on the wing (fig. 1-35). The film packet is now positioned.
4. Set the vertical angulation of the tube head at $+5^{\circ}$ to $+10^{\circ}$.



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Figure 1-35.—Patient closing on wing.

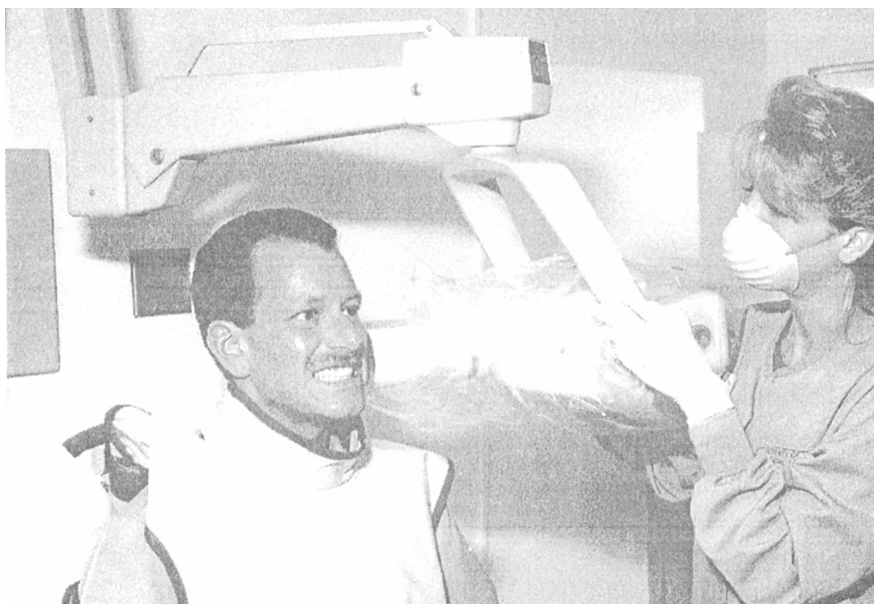
5. Center the tube head cylinder on the wing of the film packet. Be sure that the central X-ray beam passes through the embrasures as shown in figure 1-36.

6. Make the exposure. After making the exposure, put the exposed film in a clean paper cup and place in a lead lined container or behind a protective screen. You are now ready to take the radiograph on the opposite side of the patient's mouth.

OCCLUSAL EXAMINATION

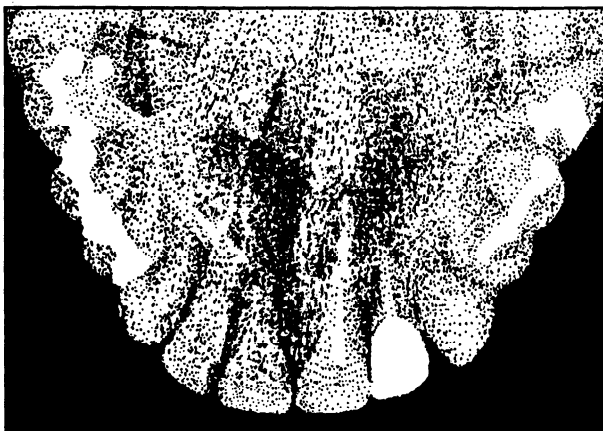
An occlusal examination is usually conducted when fractures of the jaw or gross pathological conditions are suspected. A typical occlusal radiograph (fig. 1-37) shows a large area of the maxillary or mandibular arch.

The occlusal film packet is shaped much like the periapical packet, only larger. Unlike the periapical



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Figure 1-36.—Centering tube head cylinder.



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Figure 1-37.—Typical maxillary anterior occlusal radiograph.

and bitewing packets, the occlusal packet contains two X-ray films. This allows different developing times to be used for these films. The finished radiographs can then be compared for diagnostic purposes.

Occlusal radiographs are exposed using the bisected angle technique.

MAXILLARY OCCLUSAL RADIOGRAPHS

Maxillary occlusal radiographs are taken by using the following procedures:

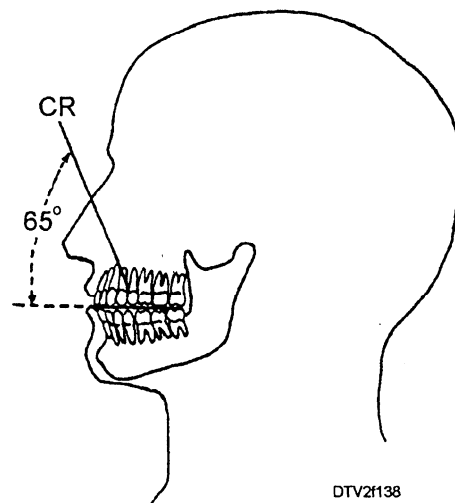
1. Set the X-ray machine at 10 mA, 90 kVp, and 60 impulses (1 second). (Reduce the kilovoltage 5 kVp if the arch is edentulous. Use 70 kVp if the patient is a child.)

2. Position the patient so that the ala-tragus line is parallel with the floor, and the mid-sagittal plane is perpendicular to the floor.

3. Place the film in the patient's mouth. Occlusal films are normally very comfortable. Have the patient relax the muscles of the mouth and cheek as much as possible. The pebbled surface of the packet should be toward the occlusal surfaces of the maxillary teeth, and the narrow side of the packet toward the patient's cheeks. To place the packet, retract one corner of the patient's mouth until the packet can be inserted. Position the packet far enough in the mouth so that it covers all the teeth. Special care must be taken to avoid gagging the patient. Have the patient close gently but firmly on the packet to hold it in place.

4. Position the tube head.

- a. For maxillary anterior occlusal radiographs, set the vertical angulation of the tube head at $+65^\circ$. Center the tube head cylinder on the bridge of the



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Figure 1-38.—Projection of central ray (CR) for maxillary anterior occlusal radiographs.

patient's nose so that the central X-ray beam will be projected as shown in fig. 1-38.

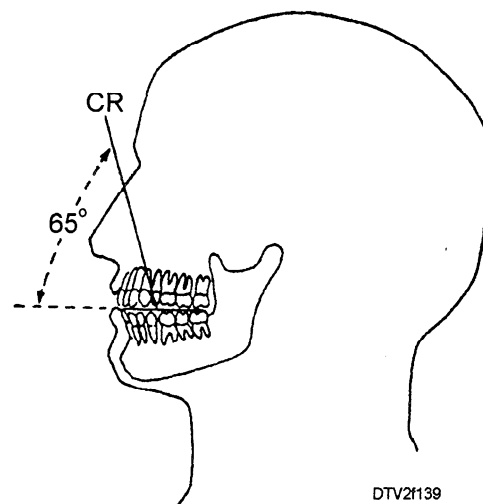
- b. For maxillary posterior occlusal radiographs, set the vertical angulation of the tube head at $+75^\circ$. Center the tube head at the top of the patient's nose so that the central X-ray beam will be projected as shown in fig. 1-39.

5. Make the exposure.

MANDIBULAR OCCLUSAL RADIOGRAPHS

Mandibular occlusal radiographs are taken by using the following procedures:

1. Program the X-ray machine for 10 mA, 90 kVp, and 60 impulses (1 second). (Reduce the kVp setting for edentulous patients and children as discussed earlier.)



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Figure 1-39.—Projection of central ray (CR) for maxillary posterior occlusal radiographs.

2. Position the patient.

a. For mandibular anterior occlusal radiographs, position the patient so that the ala-tragus line is at a 45° angle with the floor, and the midsagittal plane is perpendicular to the floor.

b. For mandibular posterior occlusal radiographs, position the patient so that the ala-tragus line and mid-sagittal plane are perpendicular to the floor.

3. Place the film packet in the patient's mouth with the pebbled surface toward the occlusal surfaces of the mandibular teeth, and the short sides of the packet are toward the patient's cheeks. Have the patient close gently on the packet to hold it in place.

4. Position the tube head.

a. For mandibular anterior occlusal radiographs, set the vertical angulation of the tube head at -10°. Center the tube head cylinder on the tip of the patient's chin so that the central X-ray beam will be projected as shown in figure 1-40.

b. For mandibular posterior occlusal radiographs, set the vertical angulation of the tube head at 0°. Center the tube head cylinder beneath the patient's chin so that the central X-ray beam will be projected as shown in figure 1-41.

5. Make the exposures.

INFECTION CONTROL

It is extremely important to pay attention to infection control when taking radiographs. Both the radiographic equipment and film can become contaminated and may result in the transmission of infectious agents. To protect themselves and the

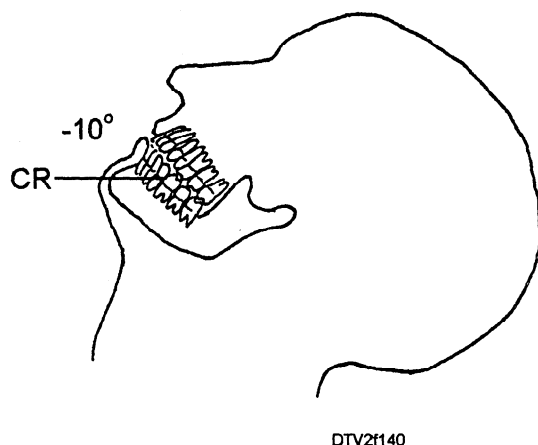


Figure 1-40.—Projection of central ray (CR) for mandibular anterior occlusal radiographs.

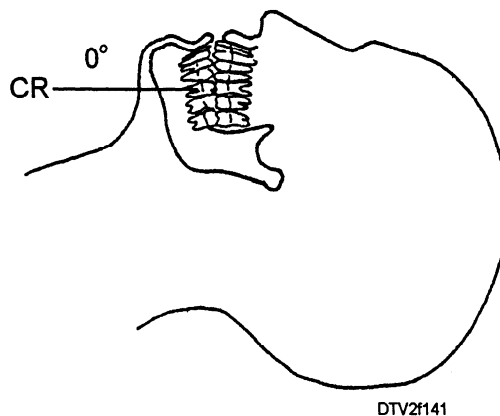


Figure 1-41.—Projection of central ray (CR) for mandibular posterior occlusal radiographs.

patients, dental personnel must maintain infection control standards in the radiology area similar to those used in the DTR. Information and procedures on the Dental Infection Control Program can be found in BUMEDINST 6600.10.

HANDWASHING

Follow rigid handwashing procedures when treating a radiology patient. Wear gloves when placing intraoral films and handling contaminated film packets.

DARKROOM

Disinfect all counter surfaces daily, and any other areas that might become contaminated such as doorknobs, light switches, and other surfaces that you might come in contact with.

FILM POSITIONING DEVICES

Film positioning devices should be disposable (single use) or heat sterilized between patients. Your command should have an adequate supply of film positioning devices to treat your daily patient load. If supplies are short, you may disinfect film positioning devices between patients by immersion in an EPA-registered chemical disinfection such as a 2 percent glutaraldehyde. Rinse thoroughly after disinfection. Follow manufacturer's instructions for high-level disinfection.

PANORAMIC UNIT BITE-BLOCKS

Use a disposable panoramic unit bite block cover for each patient. When disposable covers are not available, disinfect bite blocks as you would a film holding device.

INTRAORAL FILM PACKETS

Intraoral film packets become contaminated when they are placed in a patient's mouth during exposure. We will explain procedures on how to handle and process contaminated intraoral film packets from the X-ray room to the dark room to avoid cross contamination. Procedures using an automatic film processor with and without a daylight loader are explained next.

Automatic Film Processors Without a Daylight Loader

Procedures for using an automatic film processor without a daylight loader are as follows:

1. Wearing disposable gloves, expose an intraoral radiograph.
2. Place intraoral film packets removed from the patient's mouth directly into a clean paper cup previously set aside for this purpose. Do not contaminate the cup with soiled gloves.
3. Transfer cup to dark room.
4. While wearing the gloves used to take the radiograph, open the film packets and drop the film onto a clean paper towel without touching the film.
5. Discard film wrappers directly into a lined refuse container to prevent contamination of the darkroom work surfaces.
6. Place lead foil backing in a designated storage container.
7. Remove gloves and feed the uncontaminated film into the developer without special precautions.
8. Disinfect all areas and set up for your next patient.

Automatic Film Processors With a Daylight Loader

When using an automatic film processor with a daylight loader, contamination of the fabric light shield is likely to be a problem. Since there is no way to disinfect this shield, disposable plastic film packet covers should be used to eliminate contamination of the fabric light shield by oral fluids and glove residue. Daylight loaders should be used only when a darkroom is not available.

Disposable Plastic Film Packets

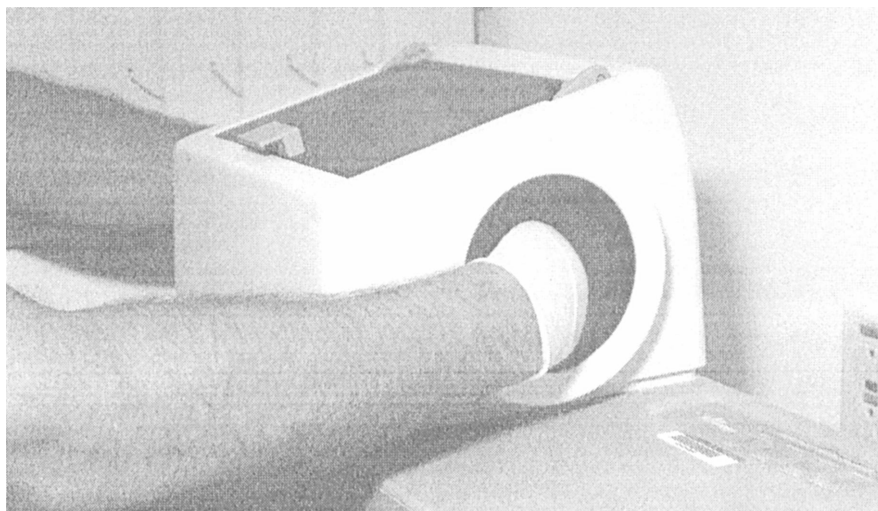
The following is a recommended technique for processing X-ray film with disposable film packet covers when using a daylight loader:

1. Wearing disposable gloves, expose an intraoral radiograph film with a disposable plastic film packet cover on it.
2. Still wearing the contaminated gloves, open the disposable plastic film packet containing the exposed X-ray film and using a sterile drop method, release the X-ray film into a clean paper cup previously set aside for this purpose.
3. Dispose of contaminated plastic film cover and gloves in a lined refuse container. Wash hands to remove powder from gloves and dry.
4. Open daylight loader and place the clean paper cup containing the exposed X-ray film inside. Close lid.
5. Place clean ungloved hands through fabric light shield and open film packet. Process X-ray film.
6. Open daylight loader and separate lead foil backing from film wrappers. Place lead foil in a designated storage container.
7. Discard film wrappers and paper cup into a lined refuse container.

Alternate Method When Not Using Disposable Film Covers

Some X-ray departments may not have disposable plastic film covers for use with automatic film processors with a daylight loader. The following is an alternate method to prevent the fabric light shield from being contaminated:

1. Place the exposed film in a clean paper cup previously set aside for this purpose.
2. Remove soiled gloves and put on a pair of clean gloves.
3. Place the cup through the top of the processing box and close the lid.
4. Place clean gloved hands through the fabric light shield as shown in figure 1-42, unwrap the film packet, and drop the film onto the surface inside the loader.
5. Place the film wrapping into the cup. Remove the gloves, turn them inside out, and place them in the paper cup.



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Figure 1-42.—Placing clean gloved hands through fabric light shield with a daylight loader.

6. Carefully grasp the film by its edges to avoid transferring powder from your hands onto the film, drop the film in the chute for developing.

7. Remove hands from the loader, lift the lid, and dispose of paper cup and waste. Ensure all lead foil is collected and stored.

8. Wash hands thoroughly.

9. If the fabric light shield sleeves become contaminated, they may be gas sterilized.

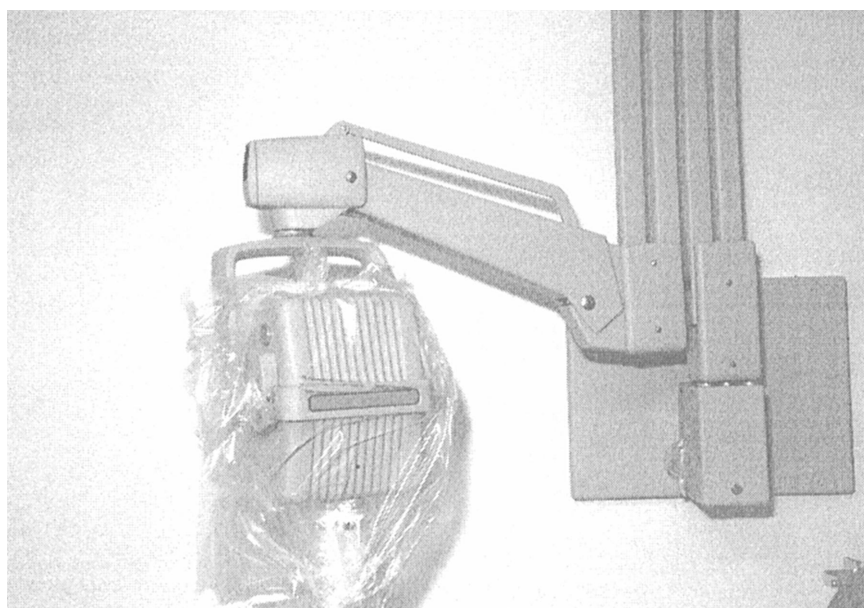
X-RAY CHAIR

Use an EPA-registered intermediate-level disinfectant on the X-ray chair daily or when visibly

contaminated. Change paper or plastic headrest covers after each patient.

X-RAY TUBEHEAD AND CONTROLS

Cover those areas contacted by the staff and patients with plastic wrap (fig. 1-43) or disposable drapes. Be careful that these coverings do not interfere with the flow of cooling air to the X-ray tube head. Change after each patient. When wiping the tubehead and controls with liquid disinfectants, exercise care to prevent disinfectant from leaking into the tube head seams and exposure controls.



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Figure 1-43.—X-ray tube head covered with plastic wrap.

FILM PROCESSING

After the patient has been radiographed, the X-ray film is processed to produce the finished radiographs. There are five basic steps involved in processing X-ray film: developing, rinsing, fixing, washing, and drying. You can process the film manually, or use an automatic film processor. For the most part, manual processing is used for a backup method for the automatic film processor and will not be discussed. If your command has manual processing capabilities, refer to the manufacturer's operating instructions. Because our discussion concerns both darkroom procedures and film processing, we will cover the darkroom first.

DARKROOM PROCEDURES

The darkroom has two sources of illumination: white light and safelight. A white light is a standard ceiling light. It provides regular illumination for mixing solutions and cleaning the darkroom. An unwrapped, unprocessed X-ray film must never be exposed to white light.

Exposed film is useless. A safelight, which contains a 15 watt bulb with a special filter, is the only safe source of illumination in the darkroom when processing intraoral and panoramic X-ray film. The safelight must be located no less than 4 feet from the work surface so that you can open film packets and process films safely. Limit the length of exposure of undeveloped dental films to the safelight for no more than 2 minutes. Films left out exceeding this time might get a fogged image (discussed under faulty radiographs).

Occasionally, films are ruined because of light leakage. White light may leak through the filter on the safelight or it may leak into the darkroom from an outside source. A simple test will enable you to detect leakage.

To check for possible light leakage from an outside source, perform the test with all lights off, including the safelight.

Take a packet of unexposed X-ray film, open the film packet, and remove the film. Lay the film on the workbench, and place a penny over it for a period of 5 minutes. Then, process the film using the procedures provided later in this chapter. The processed film should show no image. If the outline of the penny can be seen, there is light leakage and you should inform your supervisor. You should perform this test at every

location in the darkroom where unwrapped film is being processed.

SAFETY PRECAUTIONS

Because of the alkaline and acid nature of the developer and fixer solutions, minor chemical irritation or burns can occur when they come in contact with the skin, the eyes, and the mouth. Use caution when stirring or mixing solutions. Always wear rubber gloves and protective eye wear or a protective face shield and an apron when working around these solutions. If the solutions come in contact with the skin, flush the area with large amounts of water. If the solutions accidentally splash into the eyes or mouth, flush with large amounts of water and immediately seek medical attention. Fixer solution can stain and discolor clothing.

AUTOMATIC PROCESSING

Automatic processing is the most commonly used method of processing dental radiographs in the Navy. The automatic film processor mechanically transports exposed X-ray film through the developing, fixing, washing, and drying cycles. Automatic processing is quicker than manual processing, and it produces finished radiographs of uniform quality. A variety of automatic film processors are in use in the Navy and they can be generally classified as small or large.

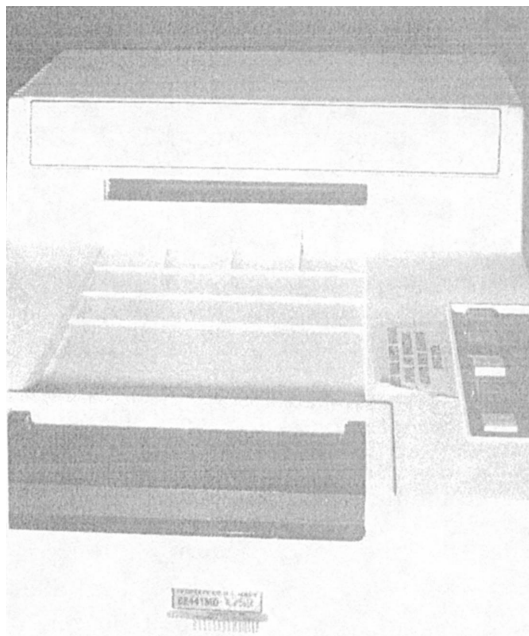
Large Automatic Film Processor

The large automatic processor (fig. 1-44) processes all sizes of dental radiographs including intraoral, occlusal, panoramic, and 8-inch x 10-inch cephalometric films.

This processor will be located in the darkroom. The X-ray film must be inserted in the processor under safelight conditions. Large automatic processors can be equipped with daylight loaders, eliminating the need for a darkroom.

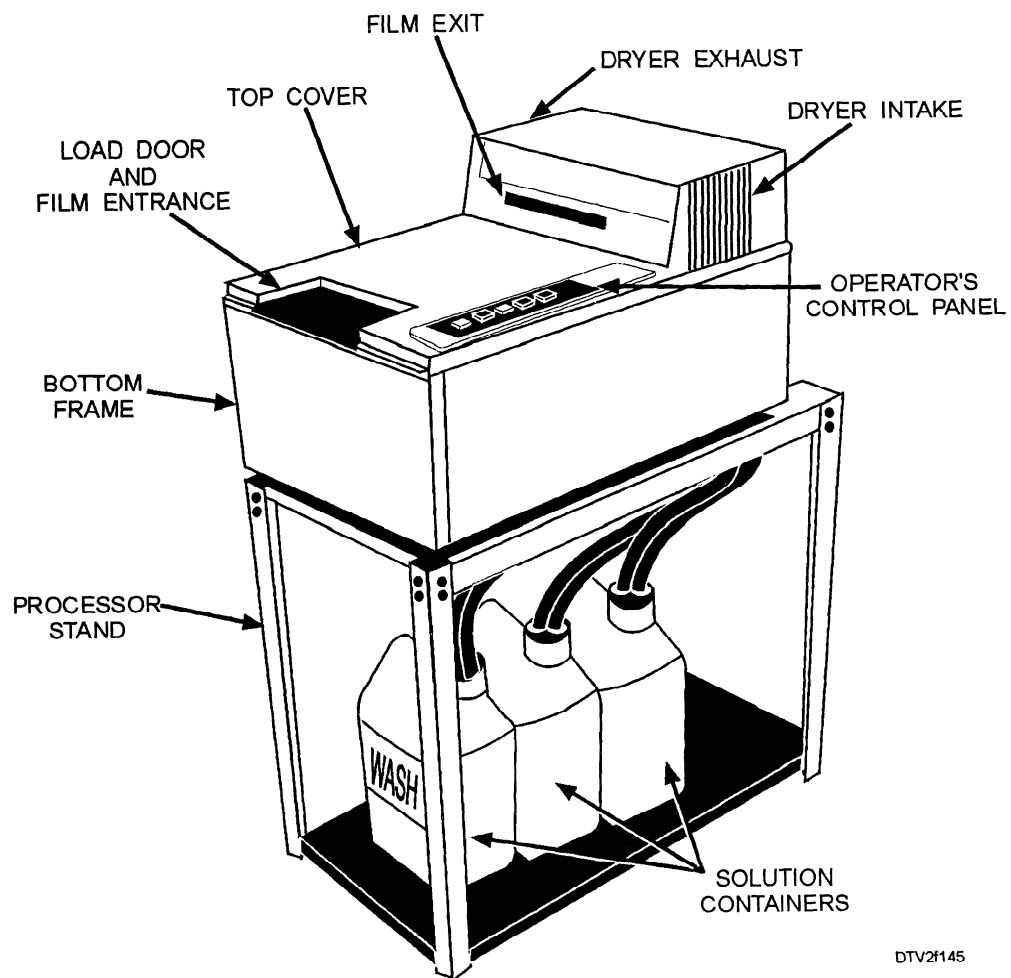
Operational Check

Perform the operational check at the beginning of each day to ensure that the processor is in good working order. It is a complex piece of equipment, so read the manufacturer's operational manual very carefully. Never attempt to repair the components inside the processor. There are a variety of large automatic processors used in the Navy today. The automatic processor's components, procedures, and



DTV2f144

Figure 1-44.—Large automatic processor.



DTV2f145

Figure 1-45.—External components of a large automatic processor.

maintenance described next are for the specific processor shown. If you work with a different make or model of an automated processor, refer to that manufacturer's operational manual for operating instructions.

Figure 1-45 shows the main external components of the large automatic film processor. Figure 1-46 shows the internal components when the top cover is opened from the processor. Figure 1-47 shows the functions of the operator's control panel.

The daily operational check of the large automatic processor is performed as follows:

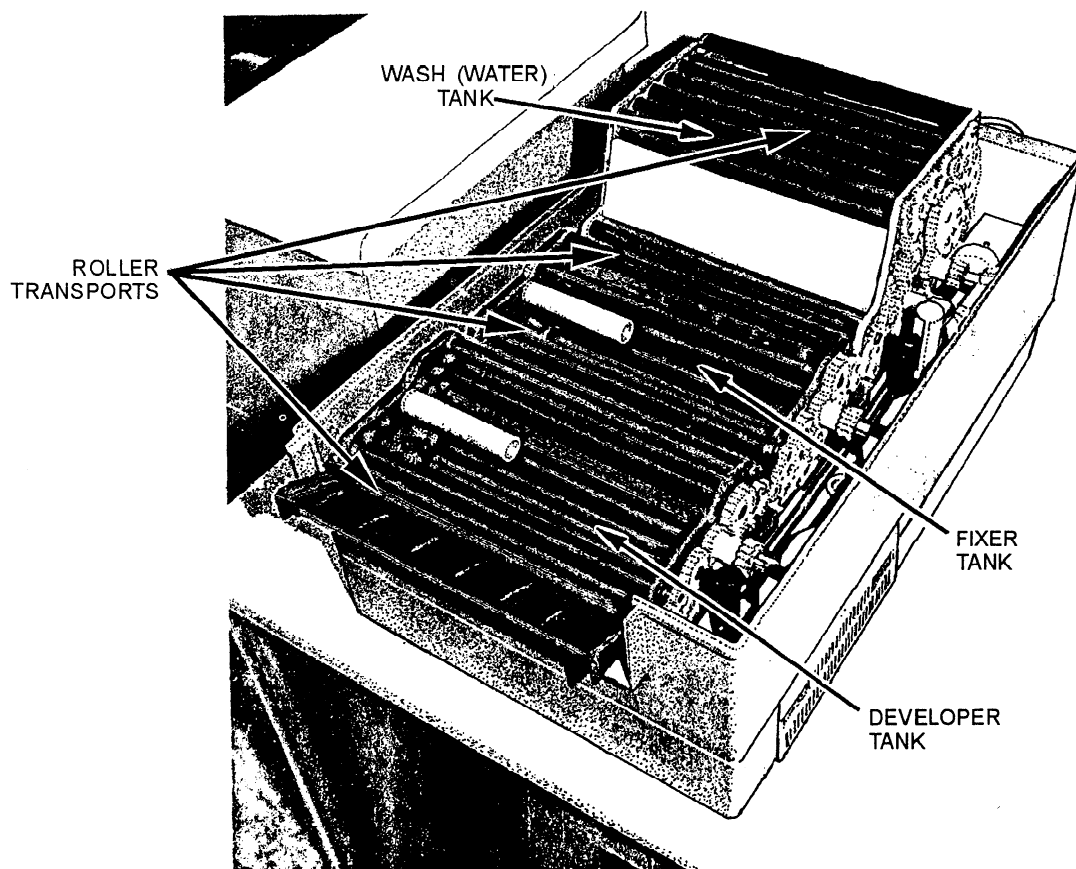
1. Plug the power supply cable into the power outlet.
2. Check the solutions. Most automatic processors are equipped with a replenisher, which automatically replenishes solutions when the power is turned on. An automatic processor without an automatic replenisher requires that you manually replenish the developer and fixer solutions. Pour the solutions slowly to avoid splashing. Direct the pouring stream to the center of the tank away from the drain tubes.

3. Turn on the external water supply valve. This valve is normally located close to and above the automatic processor. If not equipped with external water supply, change the water in wash water container and refill with fresh water.

4. Activate the automatic processor by depressing the power on switch. If equipped with an automatic replenishing system, the internal oscillating pumps will now cycle and fill the solution tanks to their proper levels. When the low solution level lamp has gone out, the solution heater will start and the transports will turn.
Do not process films at this time.

5. After 10 to 15 minutes, The ready lamp will illuminate. This indicates that the proper processing temperature has been reached.

6. Depress the run/standby switch to the run position. Insert an 8-inch x 10-inch cleaning film into the processor receiving tracks. The cleaning film cleans the rollers of accumulated deposits, dirt, and debris. Use a new cleaning film every week. After the cleaning film exits the processor, depress the run/standby switch to the standby position.



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Figure 1-46.—Internal components of a large automatic processor.

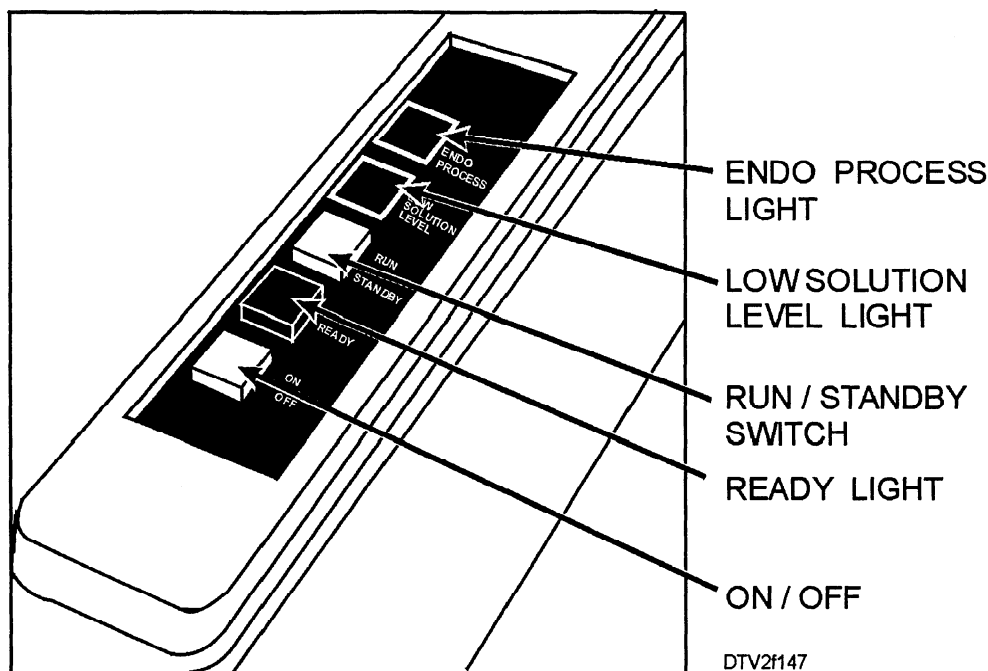


Figure 1-47.—Operator's control panel.

7. **Do not depress the on/off switch.** It should remain on for the entire working day. As long as the on/off switch is in the on position, several functions will occur throughout the day.

a. Approximately every 4 minutes, the oscillating pumps will cycle for several seconds. This action will maintain a uniform solution strength.

b. The solution heater will maintain a proper processing temperature.

c. The solution agitators will intermittently cycle, keeping the solutions well mixed.

d. The roller transports will intermittently turn, allowing the solutions to wet the rollers. This will prevent dried solution deposits from forming.

e. At the end of the working day, depress the on/off switch to the off position.

8. Some models may require that you turn the water inlet valve on the plumbing line to the off position.

Procedures For Processing Film

If you are processing a large quantity of X-ray film, you must avoid any mixup. To do this, after you insert one patient's X-ray films, wait 15 seconds before inserting the next patient's films. After inserting the X-ray films of each patient, set the X-ray mount, envelope, or identification label aside, making sure to

keep them in the order in which they were processed. This will help you match the processed radiographs to the patient's unit, envelope, or identification label when the film exits the processor.

To process X-ray films, you should follow these procedures:

1. The recommended complete processing time is 5 minutes at normal speed. If your processor has an endo speed button, this can process X-rays in 2 minutes. Endo speed is used when the dentist wants to process the film quickly. The developer temperature should be at 82°F (28°C) and the water temperature 50°F to 90°F.

2. Depress the run/standby switch to the run position to begin automatic processing.

3. Insert the X-ray film. Unwrap the film and insert it into the film receiving slot. (Remember to open the film under safelight conditions). The automatic processors can have up to six tracks to accept intraoral films. To prevent overlapping, feed the film lengthwise into every other track (e.g., insert first three films into tracks 1, 3, and 5; insert the second three films into tracks 2, 4, and 6). Feed large films lengthwise one at a time, allowing at least 15 seconds between films. Allow 15 seconds to expire after the last film disappears before inserting another film or turning on the lights or opening the darkroom door. Once the films have been inserted, the total processing time will take 5 minutes unless on the endo cycle.

To obtain the best quality radiographs, follow the film manufacturer's processing guidelines. If radiographs processed at 5 minutes and 82°F (28°C) are too dark, reduce the X-ray exposure time setting.

When the films have been processed, the finished radiographs will exit the processor on the film track and fall into the film receptacle. When the last film has exited the unit, depress the run/standby switch to the standby position. The unit will remain on standby throughout the day.

Securing The Processor

The processor should be secured at the end of the day. The securing procedures are as follows:

1. Depress the on/off switch to the off position.
2. Turn the water supply valve to the off position. (Some models without water plumbing will not require this step.)
3. Unplug the power supply cable.
4. Wipe the cover and housing of the processor with a damp sponge or cloth.

Chemistry Change

Change the developer and fixer at a minimum of once every 3 to 4 weeks. If a large quantity of X-rays has been processed, change the developer sooner. Replenish the solutions following the manufacturer's instructions.

NOTE: The solutions used for automatic processing are not the same as those used for manual processing.

Maintenance Schedule

You are responsible only for user maintenance on the processor; repairs are the responsibility of the dental equipment repair technician.

Monthly maintenance consists of cleaning the roller transports and solution tanks. Weekly maintenance consists of soaking the transport rollers, solution agitators, and other removable internal parts for 5 to 10 minutes with a processor cleaner.

NOTE: Any time the processor cover is lifted and maintenance is being performed, you must wear a safety face shield, apron, and protective gloves.

The quality of the processed radiographs are reflected in the maintenance of the processor.

Improper maintenance can cause radiographs of poor diagnostic quality, and may cause patients to have their radiographs taken over. Always follow manufacturer's instructions for correct maintenance and operating procedures.

To keep the processor in good operating condition, do not place heavy objects on top of the processor or use the top as a film loading or storage area. Do not turn the power switch on when the solution tanks are empty. Also, do not use steel wool or abrasive scouring powder when cleaning tanks or metal parts of the processor.

Small Automatic Film Processor

The small automatic processor processes only bitewing and periapical dental radiographs. The processor solutions are self contained and require no plumbing.

The small processor in figure 1-48, may be located in a darkroom, but because of its small size and compatibility with a daylight loader, it is commonly found in endodontic departments, small dental clinics, and on board Navy ships where no darkroom is available.

Operational Check and Processing

Refer to the instruction manual for the assembly and disassembly of processor components. The daily operational check for the small automatic processor is performed as follows:

1. Remove process cover and check the level of the solutions. Tank capacity for the developer and fixer tanks is 1 quart each. The wash tank holds 1 1/2 quarts of water. Figure 1-49 shows the solution tanks.
2. Plug the power supply cable into the power outlet.
3. Depress power (left) switch (fig. 1-50). Directly above the left switch, the red light goes on, indicating the chemistry heaters are on. When the green light (right) flickers (in about 15 minutes, depending on room temperature) X-rays may be processed.
4. To process films, depress the process (right) switch. The green ready light will alternate between flickering and full on, indicating an optimum 74° to 76°F temperature is being maintained.
5. Refer to the manufacturer's instruction manual procedures for processing bitewing and periapical films.